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Dimensions of Analysis for Health Informatics in Brazil

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Abstract

Over the course of the past thirty years, Brazil has developed health information systems (HIS), but today these HIS are fragmented and ongoing endeavors to integrate them have failed. Therefore, this research-in-progress links two theoretical streams – HIS in Developing Countries and Information and Informatics in Health – in order to characterize health information and communication technologies (ICT) outcomes in Brazil. Considering health ICT as a public policy, the work proposes dimensions namely democratization, effectiveness, sustainability, and synergy, in which the HIS projects can be analyzed, via the actors involved with them.

Keywords: Health Information Systems; e-Health; Public Policy; Health Informatics; Brazil.

1. Introduction

In Brazil, the first health information systems (HIS) emerged in the 1970s [1-2] and after three decades much progress has been made in an effort to develop information and communication technologies (ICT) for the benefit of health. There, HIS were developed by actors in both public and private sectors to meet the demands of health planning and management in accordance with a national strategic plan [3-4]. However, recent attempts by the Ministry of Health aiming to construct an Electronic Health Record on a national level

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failed and HIS produced in Brazil remain fragmented, limiting the use of information for the benefit of the Brazilian population [5].

While there are several HIS being used in the Brazilian health sector and access to information is a right granted by the Constitution, most citizens are not allowed to access their health records and transmit them digitally. Consequently, questions have arisen about the how has the informatization process of the health sector in Brazil taken place? Who are the winners and losers associated with this process in Brazil?

Therefore, this research-in-progress tries to find ways to answer these questions by articulating two theoretical perspectives – (a) European studies of HIS in developing countries [6-11], and (b) Information and Information Technology in Health, developed under the Brazilian Sanitary Movement [2, 4-5, 12-13]. Based on these two literature the work proposes dimensions of analysis – democratization, effectiveness, sustainability, and synergy – in order to characterize the current informatization stage of health practices in Brazil and discuss how these dimensions can be employed in analyzes of HIS projects.

This work is organized in the following way. After this introduction, second section presents the literature of HIS in developing countries. Third section presents the literature of Information and Information Technology in Health. Fourth section discusses the four dimensions of analysis and presents ways to analyze HIS projects based on such dimensions. Finally, concluding remarks and future works are presented.

2. Health Information Systems in Developing Countries

During State reforms of the 1980s and 1990s, researchers generally hailing from European universities provided consulting services to governments and international organizations, supporting ICT projects in countries of the Global South. Beginning with these activities, scientific literature began to be circulated discussing how ICT contributes to social and economic development, along with factors associated with the success or failure of ICT in developing countries [6-10].

In recent years, these studies have come to question whether ICT are really capable of promoting social and economic development [9-10] while demonstrating the importance of considering local contexts [7, 9]. In the health context, the Health Information Systems Project (HISP) and others has developed HIS for countries in the Southern Hemisphere for the last ten years [6-8, 11, 14-17], as will be seen below.

Therefore studies have sought to identify the reasons why these systems succeed or fail [6-8, 11]. There are four categorized types of failure in the implementation of HIS, namely:

(a) total failure, when “the system is never implemented or a new system is implemented but immediately abandoned” [6, p. 2];

(b) partial deployment of HIS or partial failure when “major goals are unattained or there are significant undesirable outcomes” [6, p. 2];

(c) sustainability failure, when “initiatives succeed initially, subsequently failing after a year or so” [6], also studied by Braa, Monteiro e Sahay [7], as the challenge to “make an information system work, in practice, over time, in a local setting”, as well as Kimaro e Nhampossa [11];

(d) replication failure, when “of an initiative that succeeds in its pilot location but cannot be repeated elsewhere”, [6, p. 2, 7], also addressed by Braa, Monteiro e Sahay [7] as “the problem of how to make one, working solution spread to other sites, and be successfully adapted there”.

Moreover, as revealed in the above studies, in order for HIS to bring benefits to societies that use them, it is necessary that they are kept working, disseminated and updated [6, 8, 11]. Thus, the scientific literature moves forward to identify the factors associated with the success/failure of HIS in developing countries, where studies reveal the importance of establishing networks of action [7-8, 17], technical capabilities [6, 11], and flexible standards for information sharing [8, 16] to make HIS projects viable.

The literature on HIS in developing countries, by studying the effectiveness HIS, contributes to the understanding of HIS. However, it is also necessary to consider how these HIS are contributing to the enhancement of health conditions in developing countries. Therefore, other dimensions of analysis, such as the the democratization of information, are addressed in the next section.

3. Information and Information Technology in Health: The Brazilian Sanitary Movement

The Brazilian Sanitary Movement arose in the 1970s when academics, workers and citizens launched a campaign for change in health practices and for the universal right to health. This campaign was called the Brazilian Sanitary Reform, which culminated in the institution of the Unified Health System (SUS), the current base of the Brazilian health system.

Based on the sanitarian paradigm, many lines of research were developed, notably Information and Information Technology in Health (IITH). From this perspective, systematic studies about informational practices in health in Brazil were developed since the 1980s [2, 4-5, 12-13].

IITH studies argues that "health information should be employed in a manner that reinforces human rights, that contributes to the eradication of misery and social inequalities while subsidizing the decision-making process in the field of health, in order to promote effective care, quality respecting the uniqueness of each individual and the context of each population" [13, p. 12].

Considering the needing to disseminate health information in a democratic way, such studies detected the problem of HIS fragmentation [2, 5]. In Brazil, there are various information systems to cater to specific demands [18], therefore, the lack of integration between systems results in inconsistencies in information, affecting an adequate understanding of the Brazilian population's health [2, 5]. Research based on the sanitary approach proposes alternatives to overcome the fragmentation of HIS. For this, it starts from the perspective that health ICT is a strategic space, where interests are in constant dispute.

In the early 1990s, upon observing the necessity to construct an integrated approach to diverse sources of information, Moraes [2] took the first steps toward the constitution of a National Policy on Health Information. The vision of public policy is reinforced by Vasconcellos et al. [12] and Moraes and Vasconcellos [4] who proceed in the sense of pointing to a path for the formation of a national pact around the theme of health ICT, calling for a National Conference on Health Informatics and Communication (CNIIS).

The perspective of public policy of health ICT was reinforced by the approval of the Nation Policy on Information and Information Technology in Health (PNIIS) at the 12th National Health Conference [3] which charted a long-term strategic vision and defined attributes for the different entities of the federation and for civil society, aiming at the construction of an informational reality in the field of health. However, in 2012, over seven years since the publication of the PNIIS, it can be observed that very little progress has been made. Of the 19 strategic action proposals, many of them never moved beyond the drawing board stage.

Due to this, the Sanitary Movement began to search for new ways of constructing a space for discussion about health ICT. Thus, Moraes and Gomez [5] transcended the vision of a policy for HIS, proposing the construction of a political-epistemological interfield that encompasses the various HIS and the production of information in the field, also relating them to the sundry actors involved in the heath ICT field, for example, politicians, bureaucrats and civil society.

The next section compares studies from HIS in developing countries with IITH studies, showing points where both perspectives converge and some complementary concepts arise among them and presents the four dimensions of analysis for HIS in Brazil.

4. Dimensions of Analysis for Health ICT Evaluation

HIS in developing countries research embodies a more operational focus, analyzing the success and the sustainability of HIS in the Global South. On the other hand, the literature on IITH raises questions about the democratization of HIS and of the political struggle associated with the dissemination of health information. Therefore, this work, based on tenets of the Brazilian Sanitary Movement [5, 13], perceives health ICT as a public policy that aims at promoting the development of ICT in benefit of health practices.

Considering theoretical contributions from both literatures afore cited, the health ICT public policy comprises dimensions of analysis: democratization, effectiveness, sustainability and synergy, which are consolidated below in Table 1 and described in the following paragraphs.

Table 1 – Dimensions of Analysis of Health ICT.

DIMENSIONS OF ANALYSIS	THEORETICAL PERSPECTIVE	
	HIS in Developing Countries	**Information and IT in Health**
Democratization: Information is a citizen's right and the State has the duty to disseminate health information.	----------	Information, democracy, and development [13]
Effectiveness: Most of HIS do not achieve the objectives initially planned.	Success/Failure [6]	----------
Sustainability: The HIS have no sustainability, i.e., they are abandoned after a short period of use.	Sustainability [7, 11]	----------
Synergy: The HIS fragmentation limits the State in its response to society demands.	----------	Fragmentation [2, 5]

The democratization dimension is based on the contributions accrued from the Sanitary Movement, which supports the engagement of society in discussions about health ICT [5, 13]. Likewise, the proposal is that the construction of a political-epistemological interfield must occur in a participative way, involving government and civil society actors in the discussion about health ICT [5].

The effectiveness dimension aims at analyzing the outcomes of the planned endeavors. Braa et al. [8] point out the pressing need to develop HIS effectively due to the structural needs observed in developing countries. Thus, this dimension is related to the results accrued from the application of scarce financial, infrastructural and other types of resources available in the health ICT public policy.

The sustainability dimension intends to analyze how the health ICT endeavors are supported over time. This dimension is based on the contributions accrued from the studies of HIS in developing countries [8, 11], which stress the importance of these endeavors must be sustainable, mainly after the sponsors have left the project. Thus, one must evaluate the preservation of the health ICT public policy vis-à-vis changes in the political, technological, social and economic environment.

The synergy dimension involves the compatibility of the health ICT public policy with other policies and institutional actors. Moraes and Gomez [5] argue that the fragmentation of HIS jeopardizes the capacity the

Brazilian government has to deal with health issues related to the population. Braa et al. [8] discuss the heterogeneity of these systems and the importance of integrating them in order to enable their sustainability and expansion. The next section discusses some ways to used the dimensions of analysis in practice.

4.1. Working with the Dimensions of Analysis

Both literatures follow to understand the factor associated to HIS outcomes; therefore, this section discusses how these studies try to work on the aforementioned dimensions of analysis.

Following the problem of HIS sustainability and scalability, Braa, Monteiro e Sahay [7, p. 342] proposes the use of networks of action, which are defined as those "intended to capture the dynamics of translating, aligning heterogeneous networks of routines, technology, and learning within politically-contested terrains of opposing projects and ideologies" [7, p. 342]. This network of actors is mobilized to support the system, as well as promote the sustainability and scalability of the HIS [7], technical capabilities, and learning [17]. Therefore, strategies are needed to design flexible and participatory activities that bring together the different interests, with a view to mobilizing support for HIS [7].

The synergy of various HIS is analyzed by Braa et al. [8] and others [14, 16], which, regarding local and national interests, argues that standards are necessary to integrate diverse existing HIS, as well as to allow the expansion of these systems to other places [8]. Therefore, a flexible standards strategy for information sharing is needed, whereby standards initially define a minimum data set that works as attractors and new standards are developed in an incremental way, being customized to attend local demands while national level information is kept integrated [8].

In the Sanitary Movement, Moraes and Gomez [5], looking for the democratization of information in health, argues that information and information technology interfield was proposed in order to "draw up a manifesto that considers actors, practices, procedures and knowledge that cross over as well as penetrate other 'fields' […] as they challenge and cross zones of intersection that exist in the interstices of different fields, which today seem to describe the complex and segmented facets of science and action in health." [5]. Authors also present spaces for discussion of the production of health information, comprising: civil society, government, business, and science and technology [5]. The spaces would be related and, through them, informational praxis in health would be discussed.

Finally, there are several studies about technical artifacts in developing countries [7, 19], including Brazil [20]. Stemming from perspectives such as the Actor-Network Theory, these studies identify that technical artifacts "represented a large set of technically delegated prescriptions addressed by the innovator to the user" [21, p. 211] and such systems represent the view of countries of the North. However, democratization and effectiveness regards to a local construction of solutions, considering the reality of each country or region[5, 7]. Thus, there is a broad way to discuss how HIS address health issues from developing countries.

5. Final Remarks

This research-in-progress seeks to articulate and integrate two theoretical perspectives – HIS in developing countries and Information and Information Technology in Health – to propose four dimensions of analysis, namely: democratization, effectiveness, sustainability and synergy. Considering heath ICT as public policy, such dimensions of analysis make it possible to identify how this policy is being developed, who is benefitting from it and how society is discussing this public policy. Thus, it supposed to offer comparable criteria and multiple aspects to analyze HIS development.

Based on concepts such as networks of actors, interfields, and spaces of discussion, it is possible to analyze series of elements that influence heath ICT public policy. Politicians, bureaucrats, economic groups, social

movements and research institutes, as well as previous HIS, standards and norms, are put together to explain health ICT outcomes. These heterogeneous actors interact, debate, and are influenced by the course of health ICT policy.

The dimensions of analysis, also consider the health ICT in a holistic way, encompassing and positioning all HIS in a single context. In this manner, a more comprehensive analysis of the health ICT development process is made possible. This approach opens up a research track to analyze how different HIS relate with each other, as well as actors are associated with them.

Finally, this proposition stimulate further research seeking to analyze and assess health ICT in Brazil, as well as the factors associated with the success/failure of this public policy. It is therefore to be expected that the aforementioned concepts will make it possible to find answers to the questions raised in this work regarding the current scenario of health ICT in Brazil.

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